

WHAT IS CLAIMED IS:

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1. A method of data transfer between a source port and a destination port of a transfer controller with plural ports, said method comprising the steps of:
- in response to a data transfer request, querying said destination port to determine if said destination port is capable of receiving data of a predetermined size;
 - if said destination port is not capable of receiving data, waiting until said destination port is capable of receiving data;
 - if said destination port is capable of receiving data, reading data of said predetermined size from said source port and transferring said read data to said destination port.
2. The method of claim 1, wherein each port includes at least one write reservation station, said method wherein:
- said step of querying said destination port includes:
 - determining whether any write reservation station of said destination port has not been allocated for receipt of data, and
 - if at least one write reservation is not allocated for receipt of data, determining said destination port can receive data and allocating a write reservation station for receipt of data.
3. The method of claim 2, further comprising:
- transferring data from a write reservation station
 - storing data to be transferred to an application unit coupled

4 to said destination port at a data transfer rate of said
5 application unit; and

AS 6 disallocating said write reservation station upon
7 transfer of data to said application unit.

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1 4. The method of claim 2, wherein:

2 said step of allocating a write reservation station
3 includes storing a data identifier corresponding to said write
4 reservation station; and

5 said step of transferring said read data to said
6 destination port includes storing said read data in a write
7 reservation station having a data identifier corresponding to
8 said read data.

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1 5. The method of claim 1, further comprising:

2 while waiting until said destination port is capable of
3 receiving data

4 determining if a second data transfer is pending
5 between said source port and a second destination port,
6 and

7 if a second data transfer is pending, servicing
8 said second data transfer.

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1 6. The method of claim 5, wherein:

2 said step of servicing said second data transfer includes
3 querying said second destination port to determine if
4 said second destination port is capable of receiving data of
5 said predetermined size;

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6 if said second destination port is not capable of
7 receiving data, waiting until said second destination port is
8 capable of receiving data,

9 if said second destination port is capable of receiving
10 data, reading data of said predetermined size from said source
11 port and transferring said read data to said second
12 destination port.

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1 7. A data transfer controller comprising:

2 a request queue controller receiving, prioritizing and
3 dispatching data transfer requests, each data transfer request
4 specifying a data source, a data destination and a data
5 quantity to be transferred;

6 a data transfer hub connected to request queue controller
7 effecting dispatched data transfer requests;

8 a plurality of ports, each of said plurality of ports
9 having an interior interface connected to said data transfer
10 hub and an exterior interface configured for an external
11 memory/device expected to be connected to said port, said
12 interior interface and said exterior interface operatively
13 connected for data transfer therebetween; and

14 said data transfer hub controlling data transfer from a
15 source port corresponding to said data source to a destination
16 port corresponding to said data destination in a quantity
17 corresponding to said data quantity to be transferred of a
18 currently executing data transfer request, said data transfer
19 hub further controlling said source port and said destination
20 port to

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21 in response to a data transfer request, query said
22 destination port to determine if said destination port is
23 capable of receiving data of a predetermined size;

24 if said destination port is not capable of
25 receiving data, waiting until said destination port is
26 capable of receiving data,

27 if said destination port is capable of receiving
28 data, reading data of said predetermined size from said
29 source port and transferring said read data to said
30 destination port.

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1 8. The data transfer controller of claim 7, wherein:
2 each port includes at least one write reservation station
3 for storing data prior to transfer to said corresponding
4 external memory/device;

5 said data transfer hub further controlling said
6 destination port to

7 determine whether any write reservation station of
8 said destination port has not been allocated for receipt
9 of data, and

10 if at least one write reservation is not allocated
11 for receipt of data, determining said destination port
12 can receive data and allocating a write reservation
13 station for receipt of data.

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1 9. The data transfer controller of claim 8, wherein:
2 said data transfer hub further controlling said
3 destination port to

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4 transfer data from a write reservation station to
5 said corresponding external memory/device at a data
6 transfer rate of said external memory/device, and
7 disallocating said write reservation station upon
8 transfer of data from said write reservation station to
9 said external memory/device.

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1 10. The data transfer controller of claim 8, wherein:
2 each of said plurality of hubs further includes an
3 identifier register corresponding to each write reservation
4 station; and
5 said data transfer hub further controlling said
6 destination port to
7 allocate a write reservation station by writing
8 identifier data in said corresponding identifier
9 register, and
10 store said read data in a write reservation station
11 having a corresponding identifier stored in said
12 identifier register corresponding to said write
13 reservation station.

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1 11. The data transfer controller of claim 1, wherein:
2 said data transfer controller further capable of
3 servicing a second transfer request between said source port
4 and a second destination port while waiting until said
5 destination port is capable of receiving data.

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1 12. The data transfer request of claim 11, wherein:
2 said data transfer controller further controlling said
3 second destination port to

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4      query said second destination port to determine if
5      said second destination port is capable of receiving data
6      of said predetermined size;

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10         if said second destination port is capable of
11         receiving data, reading data of said predetermined size
12         from said source port and transferring said read data to
13         said second destination port.

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4 a request queue controller connected to said plurality of
5 data processors, said request queue controller receiving,
6 prioritizing and dispatching data transfer requests, each data
7 transfer request specifying a data source, a data destination
8 and a data quantity to be transferred;

11 a plurality of ports, each of said plurality of ports
12 having an interior interface connected to said data transfer
13 hub identically configured for each port and an exterior
14 interface configured for an external memory/device expected to
15 be connected to said port, said interior interface and said
16 exterior interface operatively connected for data transfer
17 therebetween; and

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20 port corresponding to said data destination in a quantity
21 corresponding to said data quantity to be transferred of a
22 currently executing data transfer request, said data transfer
23 hub further controlling said source port and said destination
24 port to

25 in response to a data transfer request, query said
26 destination port to determine if said destination port is
27 capable of receiving data of a predetermined size;

28 if said destination port is not capable of
29 receiving data, waiting until said destination port is
30 capable of receiving data,

31 if said destination port is capable of receiving
32 data, reading data of said predetermined size from said
33 source port and transferring said read data to said
34 destination port.

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1 14. The data processing system of claim 13, wherein:

2 each port includes at least one write reservation station
3 for storing data prior to transfer to said corresponding
4 external memory/device;

5 said data transfer hub further controlling said
6 destination port to

7 determine whether any write reservation station of
8 said destination port has not been allocated for receipt
9 of data, and

10 if at least one write reservation is not allocated
11 for receipt of data, determining said destination port
12 can receive data and allocating a write reservation
13 station for receipt of data.

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1 15. The data processing system of claim 14, wherein:
2 said data transfer hub further controlling said
3 destination port to

4 transfer data from a write reservation station to
5 said corresponding external memory/device at a data
6 transfer rate of said external memory/device, and
7 disallocate said write reservation station upon
8 transfer of data from said write reservation station to
9 said external memory/device.

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1 16. The data processing system of claim 14, wherein:
2 each of said plurality of hubs further includes an
3 identifier register corresponding to each write reservation
4 station; and

5 said data transfer hub further controlling said
6 destination port to

7 allocate a write reservation station by writing
8 identifier data in said corresponding identifier
9 register, and

10 store said read data in a write reservation station
11 having a corresponding identifier stored in said
12 identifier register corresponding to said write
13 reservation station.

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1 17. The data processing system of claim 13, wherein:
2 said data transfer controller further capable of
3 servicing a second transfer request between said source port
4 and a second destination port while waiting until said
5 destination port is capable of receiving data.

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1 18. The data processing system of claim 17, wherein:
2 said data transfer controller further controlling said
3 second destination port to
4 query said second destination port to determine if
5 said second destination port is capable of receiving data
6 of said predetermined size;
7 if said second destination port is not capable of
8 receiving data, waiting until said second destination
9 port is capable of receiving data,
10 if said second destination port is capable of
11 receiving data, reading data of said predetermined size
12 from said source port and transferring said read data to
13 said second destination port.

1 19. The data processing system of claim 13, further
2 comprising:
3 a system memory connected to a predetermined one of said
4 plurality of ports; and
5 wherein each of said data processors includes an
6 instruction cache for temporarily storing program instructions
7 controlling said data processor, said data processor
8 generating a data transfer for program cache fill from said
9 system memory upon a read access miss to said instruction
10 cache.

1 20. The data processing system of claim 13, further
2 comprising:
3 a system memory connected to a predetermined one of said
4 plurality of ports; and

5 wherein each of said data processors includes a data
6 cache for temporarily storing data employed by said data
7 processor, said data processor generating a data transfer for
8 data cache fill from said system memory upon a read access
9 miss to said data cache.

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1 21. The data processing system of claim 13, further
2 comprising:

3 a system memory connected to a predetermined one of said
4 plurality of ports; and

5 wherein each of said data processors includes a data
6 cache for temporarily storing data employed by said data
7 processor, said data processor generating a data transfer for
8 data writeback to said system memory upon a write miss to said
9 data cache.

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1 22. The data processing system of claim 13, further
2 comprising:

3 a system memory connected to a predetermined one of said
4 plurality of ports; and

5 wherein each of said data processors includes a data
6 cache for temporarily storing data employed by said data
7 processor, said data processor generating a data transfer for
8 write data allocation from said system memory to said data
9 cache upon a write miss to said data cache.

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1 23. The data processing system of claim 13, further
2 comprising:

3 a system memory connected to a predetermined one of said
4 plurality of ports; and

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